is K_2HPO_4. From their experiments they further conclude that peroxidase occurs in some plants as enzyme, in others as zymogen, and that the quantity present in different plants varies considerably. The smallest quantity in any of the plants studied was found in *Aspergillus niger* and the Saccharomycetes. A suggestion is made in this connection which is very important if true. They think it probable that yeasts are capable of producing alcoholic fermentation even in the presence of free oxygen because they contain very little or no oxidizing enzymes. The experimental evidence for this view is too slender as yet to be considered seriously; but if it proves to be true, it will clear up the relation of fermentation to the respiratory process.

The quantitative distribution of peroxidase and the respiratory chromogens shows a direct correlation, tissues rich in peroxidase containing much of the chromogens, and *vice versa*. Moreover, the tissues of plants are found to contain substances which are conceived to "stimulate" the color reactions used in detecting peroxidase. The products of alcoholic fermentation, which are rich in oxidizable substances, are placed among these stimulators of the formation of respiratory pigments. Finally, boiling of aqueous extracts containing chromogens is believed to render the formation of pigments impossible, either by changing profoundly the chemical nature of the chromogens, or by destroying the substances which stimulate the formation of the respiratory pigments which are produced by the action of such substances as emulsine and peroxidase on the chromogens. Most of the conclusions and suggestions seem to rest on a minimum of experimental evidence.—CHARLES A. SHULL.

The flora of Newfoundland.—The report of a botanical expedition to Newfoundland by FERNALD[34] includes the mention of many additions to the flora of the island, which is now known to possess 783 indigenous species. An inquiry into their geographical origin shows that about 60 per cent are boreal, including 28 per cent common to southern Labrador and eastern Canada. An additional 3.5 per cent are Canadian types not found in Labrador. A surprisingly large number of species are southwestern types found also in Nova Scotia, New Brunswick, and coastal New England, but unknown or rare in Quebec and Ontario. This class contains 274 species, or 35 per cent of the Newfoundland flora. At present 16 endemic plants are known, comprising 2 per cent of the flora.

To explain the abundance of plants identical with those of the Atlantic seaboard south of Newfoundland, the writer postulates the former existence of a bridge formed by an elevated coastal plain, composed of siliceous soils, connecting the island with Cape Breton and forming an ideal highway for the northeastward advance of plants which thrive on such soil. This siliceous bridge, according to the writer, would have been highly unattractive to such

[34] FERNALD, M. L., A botanical expedition to Newfoundland and southern Labrador. Rhodora **13**:109–162. 1911.

species as *Adiantum pedatum*, *Thuja occidentalis*, *Lilium canadense*, *Calypso bulbosa*, *Lonicera canadensis*, *Solidago squarrosa*, *Aster macrophyllus*, and many other similar plants not found in Newfoundland, and which in eastern Canada "scrupulously avoid the more sterile areas." This explanation and the considerable lists of "calciphiles" indicate that the writer believes the vegetation to respond directly to the chemical character of the substratum.—GEO. D. FULLER.

Root tubercles of cycads.—Three papers on root tubercles of cycads, recording conflicting opinions, lay emphasis upon different features of these rather well known structures. ZACH[35] pays particular attention to the fungus hyphae, which branch profusely and become coiled together, after which the coils become digested. The fungus infests the tissues, causing the abnormal development, and the cell reacts by absorbing the fungus, a phenomenon which reminds the author of phagocytosis in animals. The relation is not symbiosis, but parasitism.

HOŘEJŠI[36] comes to the conclusion that the relation is symbiosis, and that the alga is the only cause of the abnormalities in the roots, the fungi and bacteria being merely the accompaniments of degeneration. The alga enters by the lenticels.

The third paper, by Miss SPRATT,[37] deals entirely with the life history of the alga, and gives a much more detailed account than has hitherto been available. She finds that the heterocysts are reproductive bodies, the contents of which break up into gonidia capable of reproducing the filament, as described by BRAND for *Nostoc*. The central body is described as a simple structure, incapable of anything but direct division. No reference is made to the work of OLIVE, whose technic and figures might have been helpful.

None of the three writers refer to the work of LIFE,[38] who described the mode of entrance of the alga and the general development of the root tubercle. —CHARLES J. CHAMBERLAIN.

Cretaceous flora of Japan.—SUZUKI[39] has described two conifers from the Upper Cretaceous of Japan as new. One of them is made the basis of a new genus (*Abiocaulis*), and is said to be nearest to *Abies* among living forms;

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[35] ZACH, FRANZ, Studie über Phagocytose in den Wurzelknöllchen der Cycadeen. Oesterr. Bot. Zeit. **60**:49–55. *pls. 2.* 1910.

[36] HOŘESJSI, J., Einiges über die symbiontische Alga in den Wurzeln von *Cycas revoluta*. Bull. Intern. Acad. Sci. Bohême **15**:1–10. *figs. 24.* 1910.

[37] SPRATT, ETHEL ROSE, Some observations on the life history of *Anabaena Cycadeae*. Ann. Botany **25**:369–380. *pl. 32.* 1911.

[38] BOT. GAZ. **31**:265–271. 1901.

[39] SUZUKI, Y., On the structure and affinities of two new conifers and a new fungus from the Upper Cretaceous of Hokkaido (Yezo). Bot. Mag. Tokyo **24**:181–196. *pl. 7.* 1910.